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Churning

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The traditional churning indicators - turnover and cost-to-equity ratios - are crude and poorly suited to the task because they can fail to detect obvious cases of churning, and erroneously signal churning in cases where none occurred. Moreover, traditional measures of damages in churning cases, particularly trading costs and benchmark portfolio measures, often give rise to inconsistent damage estimates. These failures and inconsistencies can be largely resolved through careful application of financial economics. This note improves upon traditional indicators of churning and demonstrates that, properly calculated, the trading costs estimate of damages closely parallels the well-managed theory, or benchmark portfolio, estimate of damages.

Introduction

Broker-customer disputes typically involve allegations that a brokerage firm and its registered representative “churned” or excessively traded a customer’s portfolio in order to generate income for the broker and the firm, and/or that the customer was sold investments which were unsuitable given the customer’s investment objectives. At the root of churning cases is the question “Was there a reasonable probability that the securities trading would be sufficiently profitable to cover its cost?”¹

Economists and securities industry professionals are often called as expert witnesses to assist arbitration panels in determining whether an account has been churned and, if so, what damages have been suffered by the customer. Simple ratios and rules of thumb have long served as traditional economic analyses of liability and damages issues in churning cases. However, advances in our understanding of both financial economics and computer technology now allow for more thorough analyses.

There are two common indicators of alleged excessive trading in churning cases: 1) turnover ratios, and 2) cost-to-equity ratios. Turnover ratios measure how often, on average, the securities in a customer’s portfolio are traded in a year. Cost-to-equity ratios measure the annual cost of the trading



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as a percentage of the customer's investments. Both these types of ratios are flawed, but continue to be the primary quantitative evidence in churning cases in the absence of more cost-efficient measures.

There are three common measures of damages in churning and suitability cases: 1) out-of-pocket loss, 2) benchmark portfolio, or *well-managed account*, damages, and 3) trading costs. Out-of-pocket loss is the change in a customer's equity less any net deposits made during the period. Out-of-pocket loss is an inappropriate measure of damages because it ignores the opportunity cost of invested funds. Also, general market movements that are unrelated to the alleged fraud significantly affect the out-of-pocket measure.

The benchmark portfolio measure of damages corrects the deficiencies in the out-of-pocket loss measure. The benchmark portfolio measure of damages is the difference between what the customer's equity would have been had the portfolio been appropriately managed and the customer's actual equity at the end of the disputed period. The benchmark portfolio measure of damages is most widely used in cases where the primary allegation is that unsuitable securities were purchased for the customer.

Trading costs – commissions, bid-ask spreads, mark-ups and mark-downs, margin interest, and fees incurred by the customer – are a widely used measure of damages in churning cases. Although not generally understood, the simple trading cost measure suffers the same flaws as the out-of-pocket loss because, like out-of-pocket losses, it ignores the opportunity cost of invested funds. Fortunately, the adjustment necessary to correct the simple trading cost measure is straightforward and closely analogous to the benchmark portfolio measure of damages.



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Liability in Churning Cases

Churning cases involve allegations that a stockbroker traded a customer's portfolio excessively in order to generate income for the broker and the firm without regard for the customer's best interests. Trading generates income by allowing the brokerage firm to charge explicit commissions and mark-ups and mark-downs; implicit commissions may also be charged as brokerage firms buy stock from customers at "bid" prices that are lower than the "ask" prices at which the stock is simultaneously sold to other public customers.

Turnover Ratios

Turnover ratios have been used to assess churning allegations for more than 40 years.² Turnover ratios measure the number of times the equity in an account is traded in one year. They can be calculated a number of ways. The simplest turnover measure divides total security purchases by the average month-end equity balance, and then annualizes the turnover ratio by dividing it by the number of years covered in the analysis. *See* Equation [1].

$$[1] \quad \text{Turnover} = \frac{\text{Purchases}}{\text{Average Equity}} \div \frac{\text{Days in Period}}{365}$$

Adjustments to simple turnover ratios must be made when the account contained significant cash at the start of the time period covered to estimate to the number of times an account was turned over as opposed to invested. Several variants on the simple turnover measure have been offered over the years, but their improvements are modest. The Looper measure divides purchases by the average net investment plus net realized trading gains. Although the Looper measure has some theoretical



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advantages over the simple turnover ratio, it is more difficult to calculate and for claimants, respondents, and arbitrators to understand. For these reasons, the Looper measure is not usually used.

Statistical Analysis of Turnover Ratios

Several commentators have suggested that publicly available mutual fund turnover data allow for objective determination of churning.³ Mutual funds are categorized according to investment objectives similar to those used to describe retail accounts. The incentives in the mutual fund industry are such that observed turnover ratios should be about right to achieve the funds' stated objectives. Mutual fund portfolio managers who are compensated based on assets under management are indirectly compensated based on the profitability of their investments since cash inflows tend to follow superior performance. If the turnover ratio in an account is not statistically significantly different from the average turnover ratio for mutual funds with similar investment objectives, then the observed turnover ratio does not provide evidence that the account was churned.

The courts have generally held that an observed value more than two standard deviations greater than the average value of a distribution is evidence that the observed value was not drawn from the distribution to which the observation is being compared. For instance, in employment discrimination cases, if the representation of members of a protected class is not at least two standard deviations different than the representation of members of the population as a whole, then the courts have not found evidence of discrimination.⁴

The normal distribution is a *symmetric* distribution and can be completely described by its average value and its standard deviation. Standard deviation is a measure of how much observed



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values deviate from the mean value of a distribution. Approximately 70% of the observed values lie within one standard deviation of the average value, approximately 95% lie within two standard deviations, and approximately 99.7% lie within three standard deviations of the average value.

Applying the general legal standard discussed above to churning cases, if the likelihood of a turnover ratio as high as observed is less than 2.5%, then we can conclude that the account was not managed in the customer's best interests.⁵ We estimate how likely a turnover ratio is to be observed if the account is being managed to achieve the investor's stated objectives by determining how likely it is to observe a turnover ratio this high in mutual funds with similar stated objectives.

For instance, there were 613 distinct growth mutual funds with reported turnover ratios as of September 1998.⁶ The average turnover ratio for these growth funds was 0.90 and the standard deviation was 0.85. Using these values, an observed turnover ratio greater than 2.6 in an account with a stated objective of growth is two standard deviations greater than the average value and, therefore, is evidence that the account was not managed in the customer's best interests. A turnover ratio of 4.0 is 3.6 standard deviations greater than the average. Since there is only a 0.015% chance of observing a value 3.6 standard deviations larger than the average value of a normally distributed variable, a turnover ratio of 4.0 in an account with a growth objective would be extremely strong evidence that the account was not managed in the client's best interests.⁷

However, turnover ratios are not normally distributed. Turnover ratios are bounded below at 0 and have values that extend out well beyond twice their average value. One way to deal with the asymmetric distribution of turnover ratios is to see if turnover ratios are *log*normally distributed. A



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variable is lognormally distributed if the natural logarithm of the variable is normally distributed.⁸

Fortunately, it turns out that the logarithms of turnover ratios are approximately normally distributed.

The average natural logarithm of the turnover ratio for the growth funds discussed above was -0.49 and the standard deviation was 0.97. Using these values, a turnover ratio of 2.6 in an account with a stated objective of growth is only 1.5 standard deviations greater than the average value and, therefore would not be considered evidence that the account was traded excessively. A turnover ratio of 4.3 is about 2 (not 4) standard deviations away from the average value when the *lognormal* distribution is used. Therefore based on our sample of growth mutual funds, a turnover ratio of at least 4.3 rather than 2.6 would be required to constitute evidence that the account was traded excessively.

This approach may be biased against finding excessive trading. Because institutional investors pay much lower trading costs than retail customers the optimal level of trading to achieve any given investment objective should be higher at mutual funds than in retail brokerage accounts. In addition, while the potential conflict of interest over commissions is much less in the mutual fund industry, some institutional investors trade clients' portfolios to generate soft dollars which depend on how much trading is done and how many commission dollars are spent.

At best, turnover ratios indirectly address the question of whether suspect trading was likely to benefit the customer. Turnover measures do not directly measure trading costs, likely trading profits, or a customer's sophistication, investment objective, and risk tolerance – all of which determine the acceptable level of trading. A turnover ratio of six times per year for an institutional customer may well involve lower total trading costs, and therefore be more reasonable, than a turnover ratio of only two



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times per year in a retail account. Also, certain investment strategies entail more frequent trading than other strategies. Finally, customers differ in their understanding of risk and return, as well as in their assessment of the requisite tradeoff. Thus, there is no absolute turnover ratio value that determines for all investors when trading is excessive and when it is not.

Commission-to-Equity and Cost-to-Equity Ratios

Commission-to-equity and cost-to-equity ratios are the other standard churning indicators.

Commission-to-equity ratios are calculated by dividing the commissions and mark-ups and mark-downs incurred in an account by its average equity. Commission-to-equity ratios measure the fraction of the average equity in the account that is consumed by explicit trading costs.

$$[2] \quad \text{Commission-to-Equity} = \frac{\text{Commissions, Markups and Markdowns}}{\text{Average Equity}} \div \frac{\text{Days in Period}}{365}$$

In addition to commissions and mark-ups and mark-downs, customers usually incur bid-ask spread costs when they trade securities. Cost-to-equity ratios include the bid-ask spread in the numerator and, therefore, are better indicators of the trading cost burden placed on the customer. Roughly speaking, annualized cost-to-equity ratios yield the portfolio securities' break even rate of return; the account will show a profit if, and only if, the securities' gross returns exceed the account's annualized cost-to-equity ratio.⁹

$$[3] \quad \text{Cost-to-Equity} = \frac{\text{Commissions, Markups, Markdowns and Bid - Ask Spread}}{\text{Average Equity}} \div \frac{\text{Days in Period}}{365}$$

Cost-to-equity ratios are a significant improvement on turnover ratios because they directly measure the cost of trading. Like turnover ratios, they fail to address the likely profitability of trading.



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As with turnover ratios, there is no bright line beyond which cost-to-equity ratios are determined to be excessive.

Oftentimes fact-finders seem to only require that the returns to a customer's portfolio could have reasonably been expected to exceed the trading costs incurred to determine that churning had not occurred. However, finding excessive trading only when the returns to the new portfolio could not reasonably be expected to exceed the trading costs sets too high a hurdle because it assumes that the correct performance benchmark is a zero-return investment. This break-even rate of return interpretation ignores the fact that the customer was going to earn a return on the portfolio held before the trading was done and the trading costs were incurred. Arbitration panels should find excessive trading if they determine that there was no reasonable expectation that the new portfolio's returns would exceed the old portfolio's returns by enough to cover the trading costs.¹⁰

Portfolio Approach to Churning

Turnover and cost-to-equity ratios, properly interpreted, provide rough measures of whether the trading conducted by a broker could reasonably have been expected to profit the customer. Using portfolio theory and statistical techniques, the probability that a customer would have benefited as a result of the stockbroker's trading can be more accurately determined.

The essence of the portfolio approach to churning analysis is that the expected return to trading must be compared to the trading costs incurred to determine if churning has occurred.¹¹ The NASD's rule against mutual fund flipping is based on the intuition developed more formally here. Even a turnover of 1 or a cost to equity ratio of 7% indicates excessive trading if the mutual fund purchased will perform



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virtually the same as the mutual fund sold under most market conditions.¹² The same logic applies to portfolios of individual securities assembled in retail accounts.

The expected return to trading is equal to the difference between the expected return to the portfolio after the suspect trading and the expected return on the securities held before the suspect trading. I call this expected return differential the expected return to the *trading portfolio*. The standard deviation of returns to the trading portfolio is a slightly more complicated function of the standard deviation of returns to the beginning and ending portfolios that depends on how the returns to the two portfolios are correlated.

The trading portfolio's expected return and standard deviation of returns can be estimated and the probability that the incremental profits could have covered the trading costs incurred can be calculated. Arbitrators can then determine whether that probability (10%, 20%, 30% etc.) is reasonable.

The Trading portfolio

The trading portfolio's expected return is given in Equation [4]. The standard deviation of the trading portfolio's returns is given by Equation [5] where σ_{trading} is the standard deviation of the trading portfolio's returns and $\rho_{\text{Begin, End}}$ is the correlation coefficient between the returns to beginning and ending portfolios.¹³

$$[4] \quad E[R_{\text{trading}}] = E[R_{\text{End}}] - E[R_{\text{Begin}}]$$

$$[5] \quad s_{\text{trading}} = \left(s_{\text{Begin}}^2 + s_{\text{End}}^2 - 2s_{\text{Begin}}s_{\text{End}}r_{\text{Begin,End}} \right)^{1/2}$$



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The trading portfolio’s expected return is zero if the trading does not change the non-diversifiable risk in the customer’s portfolio. If the ending portfolio has more non-diversifiable risk than the beginning portfolio, then the trading portfolio’s expected return is positive. If the ending portfolio has less non-diversifiable risk than the beginning portfolio, then the trading portfolio’s expected return is negative.

If the returns to the beginning and ending portfolios have similar standard deviations and are highly correlated, the standard deviation of the trading portfolio’s returns will be much lower than the standard deviation of either the new or the old portfolio. For instance, if the standard deviations of returns for both the beginning and ending portfolio is 25% and the correlation coefficient of their returns is 0.9, the standard deviation of the trading portfolio’s returns will be only slightly more than 10%. In the extreme, if the beginning portfolio is an S&P 500 Index mutual fund and the ending portfolio is a different S&P 500 Index mutual fund then the standard deviation of the trading portfolio’s returns will be essentially zero.

Once the expected return and standard deviation given in Equation [4] and Equation [5] are estimated, the probability that the returns to suspect trading activity would cover its cost can be readily determined according to Equation [6].¹⁴

[6] Probability ($R_{\text{trading}} \geq \text{trading costs}$) =

$$\text{Probability} \left(\frac{R_{\text{trading}} - E[R_{\text{trading}}]}{s_{\text{trading}}} \geq \frac{\text{trading costs} - E[R_{\text{trading}}]}{s_{\text{trading}}} \right) =$$

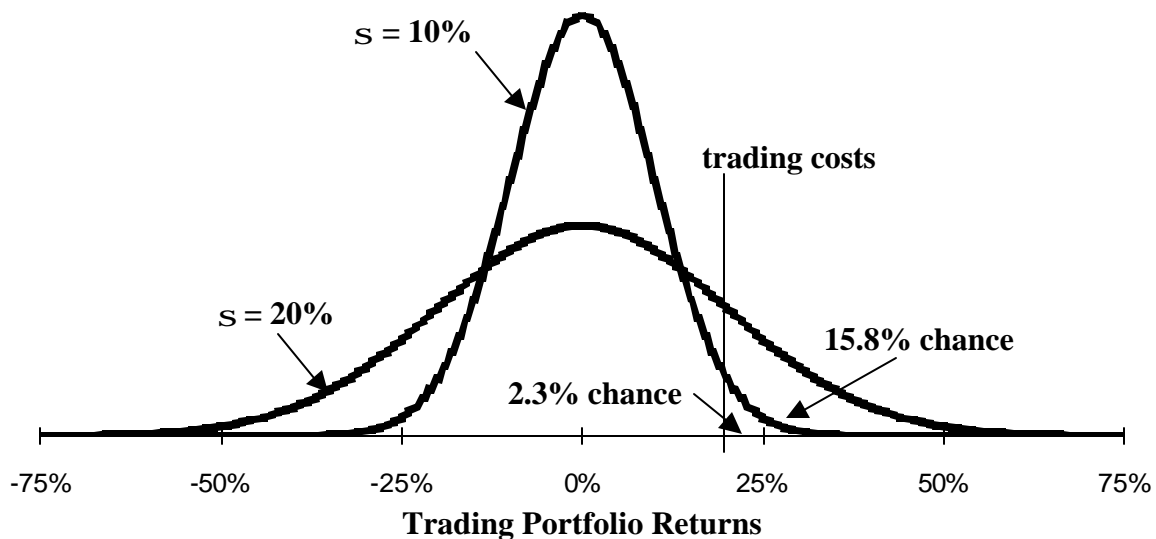
$$\text{Probability} \left(z \geq \frac{\text{trading costs} - E[R_{\text{trading}}]}{s_{\text{trading}}} \right).$$



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The probability given in Equation [6] is the area under the normal distribution to the right of the level of trading costs. See Figure 1. The more highly correlated the returns to a customer’s portfolio before and after suspect trading, the less likely the returns to the trading will cover even modest trading costs. If the customer’s portfolio exposures are changed significantly by the trading, the standard deviation of the trading portfolio’s returns will be larger and there will be a greater chance that the trading will earn enough to cover the costs incurred. A higher standard deviation “flattens out” the normal distribution putting more probability weight out in the tails of the distribution thereby making it more likely that any given level of trading costs could be covered.

**Figure 1:
The Chance of Covering Trading Costs and the Standard Deviation
of Trading Portfolio Returns**



If the trading portfolio’s expected return is zero and the standard deviation of the returns is 10% there is only a 2.3% chance that 20% annual trading costs can be covered. If the standard deviation of



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the returns is 20% (instead of 10%) there is a 15.8% (instead of 2.3%) chance that trading costs equal to 20% can be covered. For the probability that the trading profits would cover the trading costs in our example to be as high as even only one-in-four, the factor exposure of the portfolio would have to be significantly altered or the total risk in the portfolio would have to be increased dramatically.¹⁵

Consider the following simple examples of the portfolio approach to churning analysis. Imagine that an account is equally invested in 26 equity securities and that 25 of these securities are held continuously for one year but the 26th security is re-traded every week; the account is *turned over* twice during the one-year period. Further assume that trading costs incurred equal 10% of the account value. Is the turnover rate of two in our example excessive? Most commentators would probably not believe so. Is the cost-to-equity ratio of 10% excessive? Once again, most commentators would probably answer, No. Yet the returns to the portfolio held before the suspect trading and to the portfolio held after the trading will be so highly correlated that there is no reasonable possibility that the customer would benefit from the trading.¹⁶

Consider the numerical example in Table 1, which is adapted from an example used by an anonymous referee. At T=1 an investor starts with a \$20,000 two-stock portfolio of GM and IBM. This portfolio has an expected return of 15% and a standard deviation of returns of 30.41%. At T = 2, the price of GM and IBM increase and the portfolio is worth \$25,000. Portfolio weights have changed slightly and the portfolio now has an expected return of 15.04% and a standard deviation of returns of 30.65%. Now the investor sells GM and IBM and buys Ford and Dell. The Ford/Dell portfolio has an expected return of 16.04% and a standard deviation of returns of 36.08%.



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Table 1

<u>T = 1</u>									
Stock	Number of Shares	Price	Amount	Weight	E(R _i)	σ(R _i)	ρ	E(R _p)	σ(R _p)
GM	200	\$ 50	\$10,000	50%	14%	30%	0.50	15.00%	30.41%
IBM	100	\$100	\$10,000	50%	16%	40%			
<u>T = 2</u>									
GM	200	\$ 60	\$12,000	48%	14%	30%	0.50	15.04%	30.65%
IBM	100	\$130	\$13,000	52%	16%	40%			
<u>T = 3</u>									
Ford	240	\$ 50	\$12,000	48%	15%	35%	0.60	16.04%	36.08%
Dell	100	\$ 130	\$13,000	52%	17%	45%			

The expected return to this trading activity is just $E(R_{P,B}) - E(R_{P,A}) = 1\%$. Assuming the correlation coefficient between the returns to the GM/IBM portfolio and the returns to the Ford/Dell portfolio is .95, the standard deviation of the returns to the trading is 11.83%. With $E(R_{P,B}) - E(R_{P,A})$ and $\sigma(R_{P,B} - R_{P,A})$ estimated we can calculate the probability that the stockbrokers trading activity would cover the trading costs. For instance, if trading costs equal 10% then there is only a 22% chance that the Ford/Dell portfolio would outperform the GM/IBM portfolio by enough to cover the costs of trading.

This portfolio approach to churning can incorporate customers' differing sophistication, investment objectives, and risk tolerances. As demonstrated above, this approach is able to detect churning missed by the traditional turnover and cost-to-equity ratio analysis. The approach also allows for higher acceptable cost-to-equity ratios in the accounts of more speculative customers who tend, by definition, to hold poorly diversified portfolios.



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Damage Measures in Churning Cases

Assuming that the arbitrators have determined that churning has occurred, they must next assess the amount of damage suffered by the customer. Counsel for the brokerage firm will typically argue that the correct measure is out-of-pocket loss since even heavily churned accounts can show a profit in rising markets. Counsel for the customer will typically argue for the benchmark portfolio measure of damages or for trading costs — or for both.

Out-Of-Pocket Profit or Loss

Out-of-pocket profit or loss is the difference between the customer's cumulative net investments and the change in the customer's account value during the period covered by the dispute. For instance, if a customer started the year with \$1,000 equity and withdrew \$25 at the end of each quarter, but ended the year with only \$700 equity, the out-of-pocket loss would be \$200.

Equation [7] gives the value of the customer's account. I_t is the net of cash deposits and withdrawals and the value of securities received in or delivered out in period t ; TC_t is the trading cost incurred. $r_{a,i}$ is the return on the account's securities in period i before trading costs.¹⁷

$$[7] \quad \text{Account Value}_T = \sum_{t=1}^T \left\{ (I_t - TC_t) \times \prod_{i=t}^T (1 + r_{a,i}) \right\}.$$

Equation [8] subtracts net investments from the account value to yield the out-of-pocket profit or loss. The first term on the right hand side of Equation [8] is the customer's gross returns in dollars. The second term is the effect on those returns of the trading costs incurred. There will be out-of-pocket profits so long as trading costs do not consume all of the gross returns on the customer's investments.



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The longer the time period covered, and the greater the gross returns during the period, the larger the trading costs must be to generate *any* out-of-pocket loss.¹⁸

$$\begin{aligned} \text{Out - of - Pocket Los } s_T &= \sum_{t=1}^T \left\{ (I_t - TC_t) \times \prod_{i=t}^T (1 + r_{a,i}) \right\} - \sum_{t=1}^T I_t \\ [8] \qquad \qquad \qquad &= \sum_{t=1}^T I_t \times \left(\prod_{i=t}^T (1 + r_{a,i}) - 1 \right) - \sum_{t=1}^T TC_t \times \prod_{i=t}^T (1 + r_{a,i}) \end{aligned}$$

Out-of-pocket loss is a cash accounting measure of investment profits that does not consider the opportunity cost of invested capital. Since the value of alternative investments generally fluctuate over time, out-of-pocket loss is likely to overstate or understate the economic harm caused to the account. In our example, if the general market declined 25% during the year, then the portfolio outperformed the market even though the account lost 20%. Compensating the customer for the \$200 decline in the account value would require the brokerage firm to provide insurance against market losses. Conversely, if the market had risen 25% during the year, then the \$200 out-of-pocket loss significantly understates the harm suffered by the customer.

Benchmark Portfolio Damages

The *benchmark portfolio* measure of damages corrects for errors in the out-of-pocket loss measure of damages generated by general market movements. It estimates damages as the difference between the customer's ending account value and what the account value would have been had the account been well-managed. The benchmark portfolio value is calculated by applying the returns to a suitable benchmark to the customer's initial equity, and subsequent deposits and withdrawals as in Equation [9].¹⁹



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[9] Benchmark Portfolio Value $T = \sum_{t=1}^T \left\{ (I_t) \times \prod_{i=t}^T (1 + r_{b,i}) \right\}$

The benchmark portfolio must have certain attributes if it is to serve as an appropriate benchmark against which to compare the customer's actual account performance. The benchmark portfolio should be a portfolio in which the customer could have actually invested. This requirement precludes use of published indices - such as the S&P 500 or the Dow Jones Industrial Average - which cannot be purchased and which do not include the drag on performance of trading costs. Mutual funds that track broad market indices should be used in lieu of index levels.

The benchmark portfolio should also provide an unbiased estimate of the returns the customer could have earned in alternative investments. This requirement precludes *ex post* "cherry-picking" of benchmarks by claimants to maximize alleged damages, and by respondents to minimize alleged damages.

Finally, the benchmark portfolio should have a combination of stocks, bonds, and cash that is suitable given the customer's characteristics. The customer's account objectives and actual account mix may provide useful information about the correct asset mix for the benchmark portfolio. In fact, the customer's initial portfolio holdings provide an interesting benchmark portfolio since, in most cases, the initial holdings could have been maintained rather than traded.

Benchmark portfolio damages are the difference between the benchmark portfolio value given in Equation [9] and the account value given in Equation [7]. *See* Equation [10]. The first term on the right hand side is the differential returns that would have been earned on the customer's investments had they been made in the benchmark portfolio's securities instead of in the account's securities. The second



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term is the trading costs incurred brought forward to the end of the period at the rate of return earned on the account's securities.

$$\begin{aligned} \text{Benchmark Damages}_T &= \sum_{t=1}^T \left\{ (I_t) \times \prod_{i=t}^T (1 + r_{b,i}) \right\} - \sum_{t=1}^T \left\{ (I_t - \text{TC}_t) \times \prod_{i=t}^T (1 + r_{a,i}) \right\} \\ [10] \quad &= \sum_{t=1}^T \left\{ (I_t) \times \left(\prod_{i=t}^T (1 + r_{b,i}) - \prod_{i=t}^T (1 + r_{a,i}) \right) \right\} + \sum_{t=1}^T \left\{ (\text{TC}_t) \times \prod_{i=t}^T (1 + r_{a,i}) \right\} \end{aligned}$$

The first term on the right hand side of Equation [10] can be thought of as the damage due to the unsuitability of an account's securities and the second term as the damage due to the trading costs assuming the securities were suitable. In practice, most cases alleging unsuitable securities were recommended will also allege that the trading costs incurred were unnecessary and therefore excessive.

Trading Costs: Commissions, Mark-ups and Mark-downs and Bid-ask Spread

Total commissions, mark-ups and mark-downs, and bid-ask spread costs incurred in the account are frequently used as a measure of damages. This trading cost measure attempts to capture both the direct trading cost to the customer and the income to the stockbroker, his firm, and the market maker or specialist. If \$75 in commissions and other trading costs were incurred each quarter in our previous example, the traditional trading costs measure of damages would be \$300 over the year.

It is standard in broker-customer disputes to sum up these explicit trading costs, as in Equation [11], without any adjustment for the timing of the trading costs and opportunity costs. For example, if \$1,000 in trading costs was charged against an account each month for the last five years, or if \$10,000 in trading costs was charged each month over the past six months, the trading costs would usually be calculated as \$60,000.

[11]
$$TC_{Naive,T} = \sum_{t=1}^T (TC_t)$$

Corrected Trading Costs

Like the out-of-pocket loss measure, the naïve trading cost measure is a cash accounting measure that ignores opportunity costs. As with out-of-pocket loss, the naïve trading costs measure understates the harm suffered by customers due to churning in a rising market, and overstates the harm suffered by customers in declining markets.

If a broker has churned a customer’s account, then the trading costs generated have been effectively withdrawn from the customer’s account and transferred to the firm and to the stockbroker. The true cost to the customer – and the true benefit to the firm and the stockbroker – depends on how much time has passed since the trading costs were incurred and what has happened in the market during this period.²⁰

Equation [12] presents the corrected measure of trading costs. This corrected trading cost measure has the same relationship to the naïve trading cost measure as the benchmark portfolio theory of damages has to the out-of-pocket loss measure. The logic that compels the use of the benchmark portfolio measure of damages instead of the out-of-pocket loss measure equally compels the use of the corrected measure of trading costs instead of the traditional trading cost measure. In each case, a cash accounting measure is adapted to incorporate the opportunity cost of invested capital.

[12]
$$TC_{Corrected,T} = \sum_{t=1}^T \left\{ (TC_t) \times \prod_{i=t}^T (1 + r_{b,i}) \right\}$$



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A Reconciliation of Trading Costs and the Benchmark Portfolio Theory

It is not uncommon in churning cases for the benchmark portfolio measure of damages to significantly exceed the commissions, mark-ups and mark-downs, and bid-ask spreads. The difference between these measures has traditionally been attributed to either differences in asset mixes between the benchmark portfolio and the customer's portfolio, or to a lack of diversification in the customers' portfolio. In fact, correctly calculated, the trading costs measure of damages will be very close to the benchmark portfolio measure of damages, unless unsuitable investments were also made in the customer's account.

Equation [13] gives the difference between the benchmark portfolio measure of damages and the corrected measure of trading costs. This difference is the difference in the cumulative returns to the benchmark portfolio and to the customer's portfolio applied to the account's periodic net cashflows after trading costs. If the account's securities were suitable and the benchmark portfolio was properly chosen, the expected difference between the benchmark portfolio measure of damages and the corrected trading cost measure is zero.

$$[13] \text{TC}_{\text{corrected},T} - \text{Benchmark Damages}_T = \sum_{t=1}^T \left\{ \left(I_t - TC_t \right) \times \left(\prod_{i=t}^T (1 + r_{b,i}) - \prod_{i=t}^T (1 + r_{a,i}) \right) \right\}$$

Conclusion

Traditional economic analyses of alleged churning fail to incorporate modern finance theory. Turnover ratios and cost-to-equity ratios are crude tools for assessing churning allegations because they



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do not address the reasonably expected profitability of allegedly excessive trading activity. Modern portfolio theory, developed since the 1960's, can be used to directly test churning allegations.

Awarding out-of-pocket loss or naïve trading costs as damages in churning cases over-compensates claimants in declining markets and under-compensates claimants in rising markets. Both are cash accounting measures that can be significantly affected by factors affecting investment performance that are unrelated to the alleged fraud. The benchmark portfolio measure of damages corrects the out-of-pocket loss for general market movements. The economic trading costs measure similarly corrects the naïve measure of trading costs. Finally, the difference between the benchmark portfolio measure of damages and the economic trading costs will be minimal if the customer's portfolio securities were suitable.



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¹ Proof of churning typically involves three elements: self-interest of a registered representative, effective control by the representative, and excessive trading. See Loss and Seligman *Fundamentals of Securities Regulation* 1995, p.908 and *Miley v. Oppenheimer* 637 F.2d 318 (1981). The discussion here focuses on determination of excessive trading.



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² See R.H. Johnson Co., 36 S.E.C. 467 (1956), R.H. Johnson v. S.E.C. 231 F.2d 528 (1956), and *In re Looper and Co.*, 38 S.E.C. 294 (1958).

³ See Winslow, Donald A. and Seth C. Anderson, “A Model for Determining the Excessive Trading Element in Churning Claims,” *N. C. L. Rev.* 327 (1990). The mutual fund turnover measure is the ratio of the minimum of total purchases and total sales to average equity. Thus, the mutual fund turnover ratio is less than or equal to the standard turnover ratio.

⁴ See Paul Meier, Jerome Sacks and Sandy L. Zabell, “What Happened in *Hazelwood*: Statistics, Employment Discrimination and the 80% Rule,” in *Statistics and the Law* eds. Morris H. Degroot, Stephen E. Fienberg and Joseph B. Kadane, Wiley Classics Edition 1994.

⁵ While we use two standard deviations as the cutoff for finding excessive trading, statistical significance is a relative concept. The greater the difference between (1) the observed turnover ratio and (2) the average turnover ratio of well managed accounts expressed in standard deviations, the greater the likelihood that the account was not managed in the best interests of the customer.

⁶ There were 1559 growth mutual funds covered by Morningstar in 1998. Many of these were duplicative of other funds differing only in their sales loads. Others did not have a reported turnover ratio.

⁷ The probabilities cited should not be interpreted as the probability that fraud did not occur. If we determine there is only a 2.5% chance of observing a certain turnover ratio in the absence of fraud, we can not conclude that we are 97.5% certain that fraud has occurred. See *supra* note 8 at p. 10.

⁸ See Mark Kritzman, “What Practitioners Need to Know About Lognormality,” *Financial Analysts Journal* 10 July-August 1992.

⁹ The actual breakeven rate of return is between the Cost-to-Equity Ratio and $\frac{\text{Cost - to - Equity Ratio}}{1 - \text{Cost - to - Equity Ratio}}$.

¹⁰ The importance of separately identifying market gains and trading gains when evaluating the profitability of trading is succinctly discussed in Bagehot (1971).

¹¹ The return to the beginning portfolio and to the ending portfolio refer to the returns in percentage terms to portfolios made up of the same securities in the same proportions as found in the beginning and ending portfolio. There are many practical difficulties to the application of the portfolio approach described here a full discussion of which is beyond the scope of this paper. For instance, the analysis presented herein in theory could be applied to each trade. In practice, the analysis would be done on a monthly, quarterly or annual basis.

¹² Another example of excessive trading missed by the traditional analysis that could be captured by this more sophisticated analysis is when one or more bond mutual funds are sold and the proceeds used to purchase annuities backed by virtually identical bond mutual funds.

¹³ The correlation coefficient, r_{ij} , indicates the extent to which higher or lower than average values of one random variable are likely to occur when higher or lower than average values of another random variable occur. $r_{ij} \equiv \text{Cov}_{ij} / (\sigma_i \sigma_j)$. The correlation coefficient varies from -1 to $+1$. See Kaye, David H. and David A. Freedman, “Reference Guide on Statistics in *Weinstein’s Evidence Reference Manual on Scientific Evidence Special Supplement* 1995. For a detailed discussion of modern portfolio theory see Markowitz (1991), Bodie, Kane and Marcus (1993) or Sharpe, Alexander and Bailey (1995).

¹⁴ The trading costs have been converted to an annualized fraction of the portfolio’s equity. Trading costs in Equation [6] are in the same units of measure as the expected returns.

¹⁵ Concerns about suitability may be raised if the trading results in significant changes in the investor’s factor exposures. The NASD’s Rules of Conduct require that stockbrokers have a reasonable basis for their investment



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recommendations. Stockbrokers are required to determine the appropriateness of recommended investments based on their customer's age, wealth, investment sophistication, investment goals and objectives, and aversion to risk. In addition, stockbrokers are required to inform their customers of the pertinent facts concerning all recommended investments.

Absent fraud or market manipulation, the suitability of an investment is typically determined by the effect the investment has on the leverage and diversification in the customer's account. For instance, futures, options, and margin trading increase the leverage in an account and, therefore, are generally considered unsuitable for a customer with conservative investment goals. Also, a significant concentration in a few securities within a conservative customer's account is usually not suitable. Typically, the more conservative the customer, the less leveraged and better diversified is his suitable portfolio.

¹⁶ Unless there are dramatic changes in the types of stocks held in the account before and after the trading, the returns to these portfolios will be dominated by non-diversifiable risk and, therefore, their returns will be highly correlated.

¹⁷ Equation [7] and Equation [8] treat account equity at the beginning of the period as an investment inflow.

¹⁸ An interesting interpretation of Equation [8] can be developed by adding the second term on the right hand side to both sides and dividing through by the first term on the right hand side. The resulting equation shows the allocation of the investment returns to the customer and to the brokerage firm. So long as the registered representative leaves even 1% of the investment returns the out-of-pocket losses will zero.

¹⁹ Unlike $r_{a,i}$, $r_{b,i}$ includes the trading costs associated with managing the benchmark portfolio – including the costs of trading securities in the portfolio - since the benchmark portfolio is constructed of no-load mutual funds. Equation [9] could be modified to separate out the mutual funds' gross returns and the trading costs they incur but in practice it is much easier to use the net return formulation in Equation [9].

²⁰ In *Haaz et al v. Oppenheimer et al*, NASD Arbitration #97-05323, the market-adjusted trading cost measure estimate, \$454,293, was 50% greater than the traditional measure. While the award does not state explicitly the reasoning for the dollar value awarded, it is noteworthy that the arbitrators awarded exactly \$454,293.